# Call for Papers: Announcing a New Section

## Input-Output and Hybrid Life Cycle Assessment

*Dear Readers of Int J LCA*

Input-Output Analysis (IOA) is an economic discipline that deals with the interdependencies between and within industries and households through producing and consuming products and services, and covering the distribution of labor income and profits and the investment of capital. The entire field of IOA is based upon a life-long dedication by Professor Wassily Leontief (1906–1999), a Nobel laureate for this achievements. His early ideas on inter-industry analysis go back to the 1920s and were not well acknowledged then. He clearly noticed the limitations of partial analysis of economics in understanding the fundamental structure of an economy and tried to develop a systems view on a broader statistical basis. His, and also the world's, first large-scale empirical Input-Output (IO) study was published in 1941, and today almost all countries regularly compile IO-tables as part of their national accounts.

In the course of the remarkable development in Life Cycle Assessment (LCA) during the last decade, the economic discipline of IOA has been re-discovered as a useful source of knowledge in strengthening LCA. In various international conferences, new sessions have been prepared for IOA and LCA in combination by the Society of Environmental Toxicology and Chemistry (SETAC) Europe, the International Input-Output Association (IIOA), and the International Society for Industrial Ecology (ISIE). A joint Working Group (WG) has been launched by SETAC Europe and ISIE to facilitate a better information exchange. Several commercial and non-commercial LCA-software tools are being adapted to incorporate IO- and hybrid LCAs.

What brings the LCA-community to this seemingly remote economic discipline? From the theoretical side, the rich findings on IO-systems, which have apparent similarities with LCA-systems, are considered as a valuable knowledge-base for various issues in LCA including allocation, dynamics, computation and analytical techniques. For instance, since early 1960s, the discussion on allocation in LCA including system expansion and partitioning methods finds its worked-out discussions in IOA; since early 1970s, resources use and pollutant emissions and their abatements in industrial processes have been extensively discussed involving many IO-economists including Leontief himself. From the application side, IO-tables, either as they are or in combination with process data, are now utilized in LCA as generic product systems of national economies. Hybrid LCA[1] has already been practiced for a decade now and is considered as a practical solution for the long-recognized problem of incomplete systems specification in process-LCA due to boundary cut-offs. Last but not least, IOA provides a gateway to reach broader venues of LCA-applications for e.g. policy-support, analysis of international trade, etc. Application of IOA and LCA for Integrated Product Policy (IPP) and Sustainable Production and Consumption are the examples. However, it is clear that many possibilities of IOA in assisting and finding new potentials of LCA are still unexplored.

In this context, the opening of a new section in Int J LCA, *IO-and hybrid LCA*, which I hereby am grateful to announce, is timely and appropriate. This section will cover a wide range of applications of IOA in LCA, which includes, among others,

1) exposition of IO-theory and analytical tools as can be applied to LCA;
2) practical applications of IO-data and tools for use in LCA;
3) use of IOA and LCA in combination for decision-making and policy-support;
4) analysis of uncertainties concerning process-LCA, IO-LCA and hybrid LCA;
5) IO- and hybrid LCA in relation to the ISO 14040ff international standards and
6) new application areas of LCA through IOA.

Now this section is open to your valuable contributions and will serve as a platform for a lively and sound discussion on the subject. I'll be looking forward to seeing your manuscripts and also welcome your advice on this section.

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[1] **Hybrid LCA:** An LCA based on unit processes is specific and detailed, while generally incomplete due to cut-offs. On the other hand, IO-LCAs are more complete in system boundaries but lack process specificity. Attempts to overcome the disadvantages, while combining the advantages of both methods in LCA, are generally referred to as hybrid LCA. The idea of hybrid approaches goes back to 1970s in the context with the field of IO-energy analysis.

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## Missing Inventory Estimation Tool Using Extended Input-Output Analysis

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**Intention, Goal, Scope, Background:** Input-Output Analysis (IOA) has recently been introduced to Life Cycle Assessment (LCA). In applying IOA to LCA studies, however, it is important to note that there are both advantages and disadvantages.

**Objectives:** This paper aims to provide a better understanding of the advantages and disadvantages of adopting IOA in LCA, and introduces the methodology and principles of the Missing Inventory Estimation Tool (MIET) as one of the approaches to combine the strengths of process-specific LCA and IOA. Additionally, we try to identify a number of possible errors in the use of IOA for LCA purposes, due to confusion between industry output and commodity, consumer's price and producer's price, etc.

**Method:** MIET utilises the 1996 US input-output table and various environmental statistics. It is based on an explicit distinction between commodity and industry output.

**Results and Discussion:** MIET is a self-contained, publicly available database which can be applied directly in LCA studies to estimate missing processes.

**Conclusion:** By adopting MIET results in existing, process-based, life-cycle inventory (LCI), LCA practitioners can fully utilise the process-specific information while expanding the system boundary.

**Recommendation and Outlook:** MIET will be continuously updated to reflect both methodological developments and newly available data sources. For supporting information see http://www.leidenuniv.nl/cml/ssp/software/miet